

Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

MECHANICS.

82. Proposed by WALTER H. DRANE, Graduate Student, Harvard University, Cambridge, Mass.

A sphere, diameter 2a. rests in limiting equilibrium upon the edge of a box and against a vertical wall. If the box be of such dimensions that it will not tip, find the distance of the box from the wall, having given the coefficient of friction between the sphere and wall $\frac{1}{2}$, between the sphere and box $\frac{1}{2}$, and between the box and floor $\frac{3}{2}$. [From Problems in Mechanics proposed to class in Harvard University.]

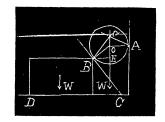
Solution by G. B. M. ZERR, A. M., Ph. D., Professor of Mathematics and Science, Chester High School, Chester. Pa.

Let W=weight of sphere, W'=weight of box, $\mu=\frac{1}{2}$, $\mu'=\frac{1}{3}$, $\mu''=\frac{3}{3}$, $\theta=\angle BCD$, S=normal reaction of wall, R=normal reaction of box, d=distance of box from wall.

 $\therefore d=AO+BE=a(1+\sin\theta)$, since BO is perpendicular to BC.

Also $S=\mu'R\cos\theta+R\sin\theta=\mu''W'$ (resolving horizontally).

$$\therefore S = \frac{3}{8} W', R = \frac{\mu'' W'}{\mu' \cos \theta + \sin \theta}$$
$$= \frac{2W'}{\cos \theta + 3\sin \theta}.$$



Also $\mu S + \mu' R \sin \theta + R \cos \theta = W$ (resolving vertically), or $\frac{1}{2}S + \frac{1}{3}R \sin \theta + R \cos \theta = W$.

The values of S and R in the last equation give

$$\frac{1}{2}W' + \frac{2W'\sin\theta}{3\cos\theta + 9\sin\theta} + \frac{2W'\cos\theta}{\cos\theta + 3\sin\theta} = W.$$

$$\therefore \tan\theta = \frac{7W' - 3W}{9W - 5W'}, \sin\theta = \frac{7W' - 3W}{\sqrt{90W^2 - 132WW' + 74W'^2}}.$$

$$\therefore d=a\left[\frac{\sqrt{90W^2-132WW'+74W'^2}+7W'-3W}}{\sqrt{90W^2-132WW'+74W'^2}}\right].$$

If
$$W=W'$$
, $d=\frac{1}{2}a(2+\sqrt{2})$.

83. Proposed by MARY M. BLAINE, B. Sc., Graduate Student, Drury College, Springfield, Mo.

A particle is projected upwards in vacuo with a velocity v. Show that on reaching the ground again there is no deviation to the south, but the deviation to the west is $4\omega\cos\lambda(v^3/3g^2)$. [Laplace, iv, page 341.]